

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-059834

(43)Date of publication of application : 26.02.2002

(51)Int.Cl. B61L 27/00
B60S 5/00

(21)Application number : 2000-252536

(71)Applicant : HITACHI LTD

(22)Date of filing : 23.08.2000

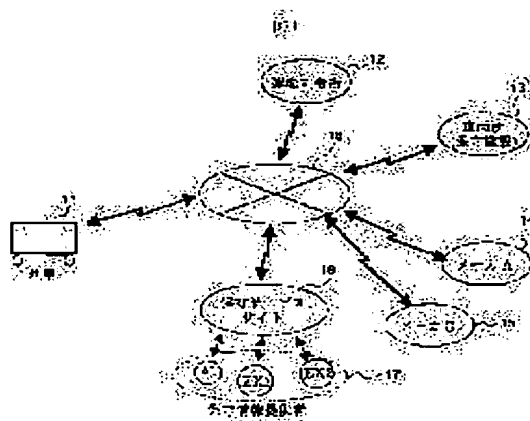
(72)Inventor : INARIDA SATOSHI
OZAWA HIROYUKI

(54) SUPPORTING METHOD AND SUPPORTING SYSTEM FOR VEHICLE MAINTENANCE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a vehicle maintenance supporting system capable of shortening the time required for a recovery, when something gets wrong with a vehicle in operation.

SOLUTION: If something gets wrong with a vehicle, its operator reports the condition of the vehicle to an operation directing center. The operation directing center discriminates whether the defective vehicle can continue operating or not, and if the train can not be operated, the operation of the vehicle is stopped and is led to a vehicle site. On the other hand, data for the defective vehicle are transmitted to related departments through an information transmitting means and a network which are not shown in the figure. A maintenance service site analyzes the data for the defective vehicle, identifies a defective place and a cause, and transmits the defective place and the cause and the contents and procedures required for a recovery work to the vehicle site. The vehicle site makes preparation for the recovery work based on work information obtained from the maintenance service site, and starts the recovery work as soon as the vehicle arrives. The maintenance service site orders replacement parts from a manufacture who has supplied the defective device at need, and the manufacturer can bring information required for repair, manpower and the replacement parts to the vehicle site whenever at need.



LEGAL STATUS

[Date of request for examination]

07.04.2003

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] When failure connects the condition of a car to a train-operation-dispatching place at the time of generating and operation of a train is not made to the car under operation in the car maintenance exchange approach, while stopping operation of the car and guiding a car to a car place The maintenance service site which distributed the fault data of a car to the maintenance service site through the means of signal transduction and networks, such as wireless, and received fault data The analysis of fault data and the specific activity of a failure part and a cause are done, and the contents and the procedure of an activity required for a failure part, a cause, and restoration are transmitted to the car place which is the maintenance facility of a car. A car place The car maintenance exchange approach characterized by preparing a rehabilitation work based on the activity information acquired from the maintenance service site, and starting a rehabilitation work with arrival of a car.

[Claim 2] It is the car maintenance exchange approach according to claim 1 which said maintenance service site arranges a substitute part to the manufacturer who supplied broken equipment, and is characterized by a manufacturer sending information required for repair and exchange, a staff, and a substitute part into said car place if needed.

[Claim 3] The train-operation-dispatching place which has managed operation of the car under operation, and a car in a car maintenance support system, The car place which is the maintenance facility of a car, and a maintenance service site are connected and constituted through a network. The car under said operation The maintenance service site which distributed the fault data of a car to the maintenance service site through the means of signal transduction and networks, such as wireless, and received fault data at the time of generating of failure The analysis of fault data and the specific activity of a failure part and a cause are done, and the contents and the procedure of an activity required for a failure part, a cause, and restoration are transmitted to the car place which is the maintenance facility of a car. A car place The car maintenance support system characterized by preparing a rehabilitation work based on the activity information acquired from the maintenance service site, and performing a rehabilitation work with arrival of a car.

[Claim 4] It is the car maintenance support system according to claim 3 which a car appliance maker is connected to said network, and said maintenance service site arranges a substitute part to the manufacturer who supplied broken equipment, and is characterized by a manufacturer sending information required for repair and exchange, a staff, and a substitute part into said car place if needed.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the car maintenance exchange approach and a support system, and relates to the car maintenance exchange approach and support system which made it possible to shorten the time amount which the restoration takes especially at the time of failure of the rail car under operation etc.

[0002]

[Description of the Prior Art] Generally, when failure occurs in the rail car under operation, the failure information is transmitted to train operation dispatching from a driver. Then, by decision of train operation dispatching, a car is forwarded by the car place which maintains a car and repair of a locating fault is performed. When the part and cause of failure can be clarified from the situation of failure at this time, in a car place, repair or exchange of a failure part is prepared before arrival of a failure car, and an activity is started to the arrival and coincidence of a car which failure generated.

[0003] By the above-mentioned, the approach of the car maintenance exchange by the conventional technique mentioned above shortens time amount from breakdown generating to restoration as much as possible, and makes effect of operation on a train the minimum.

[0004] On the other hand, the conventional technique mentioned above may not be able to do the part or cause of failure clearly depending on the information from which the generating situation, the driver, and train operation dispatching of failure were obtained.

[0005] Drawing 3 is a flow chart explaining the restoration procedure in the car maintenance exchange by the conventional technique, and explains this hereafter.

[0006] (1) If failure occurs on the car under operation, the driver will connect the condition of a car to train operation dispatching (steps 31 and 32).

[0007] (2) When it is able to operate, make operation continue as it is, judging from the condition of a car of having received whether the continuation of operation of the failure car having been possible for train operation dispatching (steps 33 and 34).

[0008] (3) When it is judged that the continuation of operation of train operation dispatching is impossible, stop operation of cars, such as the usual operating operation by the car, by step 33. And the damaged car is guided to a car place by directions of train operation dispatching (step 35).

[0009] (4) After a car arrives at a car place, while performing check of the part where failure is suspected, and data read-out from fault data are recording equipment currently mounted and performing analysis of fault data, and specification of a failure part and a cause, work on countermeasures in a car place (steps 36-38).

[0010] (5) Based on the examination result in step 38, start preparation of an activity and start repair of a failure part. A failure part is exchanged when the direction exchanged when repair of a failure part was difficult is restored early. Repair is difficult in that case, and when there is no substitute part, a manufacturer is contacted, a substitute part is ordered, the exchange activity after substitute part arrival is done, and a car is restored (steps 39 and 3A).

[0011] As mentioned above, when the part or cause of failure were not clearly made depending on the information from which the generating situation, the driver, and train operation dispatching of failure were obtained and the conventional technique was not after a failure car arrives at a car place, it was what cannot perform read-out of fault data and data analysis.

[0012]

[Problem(s) to be Solved by the Invention] Car maintenance exchange according to the conventional technique for it mentioning above Since it was working on countermeasures while performing check of the part where failure is suspected, and data read-out from fault data are recording equipment currently mounted and performing analysis of fault data, and specification of a failure part and a cause, after the damaged car arrived at the car place Much time amount is required by restoration from generating of a breakdown, and it has the trouble that there is concern which causes trouble to operation of a train.

[0013] The purpose of this invention solves the trouble of the conventional technique mentioned above, and is to offer the car maintenance exchange approach and support system which made it possible to shorten the time amount which the restoration takes at the time of failure of the car under operation etc.

[0014]

[Means for Solving the Problem] When failure connects the condition of a car to a train-operation-dispatching place at the time of generating and train operation is not made to the car under operation in the car maintenance exchange approach, while according to this invention said purpose stops operation of the car and guides a car to a car place The maintenance service site which distributed the fault data of a car to the maintenance service site through the means of signal transduction and networks, such as wireless, and received fault data The analysis of fault data and the specific activity of a failure part and a cause are done, and the contents and the procedure of an activity required for a failure part, a cause, and restoration are transmitted to the car place which is the maintenance facility of a car. A car place A rehabilitation work is prepared based on the activity information acquired from the maintenance service site, and it is attained by starting a rehabilitation work with arrival of a car.

[0015] Said purpose is set to a car maintenance support system. Moreover, the car under operation, The train-operation-dispatching place which has managed operation of a car, and the car place which is the maintenance facility of a car, A maintenance service site is connected and constituted through a network. The car under said operation distributes the fault data of a car to a maintenance service site through the means of signal transduction and networks, such as wireless, at the time of generating of failure. The maintenance service site which received fault data The analysis of fault data, Do the specific activity of a failure part and a cause, and the contents and the procedure of an activity required for a failure part, a cause, and restoration are transmitted to the car place which is the maintenance facility of a car. A car place prepares a rehabilitation work based on the activity information acquired from the maintenance service site, and is attained by performing a rehabilitation work with arrival of a car.

[0016] By having the means mentioned above, in a car place, this invention can start a rehabilitation work immediately, if pinpointing of a failure part, preparation of repair, and arrangements of a substitute part are attained and a failure car arrives at a car place, without waiting for arrival of a car, and it can shorten sharply the time amount which car restoration takes.

[0017]

[Embodiment of the Invention] Hereafter, a drawing explains 1 operation gestalt of the car maintenance support system by this invention to a detail.

[0018] The block diagram showing the configuration of the car maintenance support system according [drawing 1] to 1 operation gestalt of this invention and drawing 2 are the flow charts explaining the correspondence procedure at the time of breakdown generating. drawing 1 R> 1 -- setting -- 11 -- for a car place, and 14 and 15, the manufacturers A and B 16 of a maintenance service site and 17 are [a train and 12 / a train-operation-dispatching place and 13 / a maintenance information provider and 18] networks.

[0019] The car place 13 and the manufacturers 14 and 15 of a car device who perform the train-operation-dispatching place 12 which manages operation of a train 11 and a train, maintenance, repair, etc., and the maintenance service site 16 which has the maintenance information provider 17 being connected to a network 18 through the communication device which each has, and delivering [the car maintenance support system by 1 operation gestalt of this invention] and receiving information mutually, as shown in drawing 1 is constituted possible.

[0020] In the above-mentioned, the maintenance service site 16 is constituted so that the information from experienced persons, such as a manufacturer who has the information on car maintenance, can be received, while carrying out the data relevant to a breakdown as a database about a breakdown and having them. The maintenance information provider 17 who are these databases and a experienced person may be connected to

the maintenance service site through said network 18 or 2nd network. The database has managed ID of the loading equipment of a car, and can manage a manufacturer, a repair career, an operation career, etc., and can use them for the analysis of fault data.

[0021] Next, in the operation gestalt of this invention constituted as mentioned above, a correspondence procedure when a breakdown occurs on the train under operation is explained with reference to the flow shown in drawing 2.

[0022] (1) If failure occurs on the car under operation, the driver will connect the condition of a car to a train-operation-dispatching place (steps 21 and 22).

[0023] (2) Judging from the condition of a car of having received whether the continuation of operation of the failure car having been possible for a train-operation-dispatching place, direct a correspondence procedure to a driver. A driver performs actuation followed by making it directions from a train-operation-dispatching place. Consequently, when it is able to operate, operation is made to continue as it is (steps 23 and 24).

[0024] (3) If a train-operation-dispatching place judges that operation continuation of a train is not desirable, it will stop operation of cars, such as the usual operating operation by the car, and will take down the PAX to step 33. And the damaged car is guided to a car place by directions of train operation dispatching (step 25).

[0025] (4) On the other hand, if failure occurs on the car under operation, the fault data of the car will be distributed to the train-operation-dispatching place 12, the car place 13, and the maintenance service site 16 through the means of signal transduction and network 18 which are not illustrated [wireless], and will be distributed to its related post of the car appliance maker 14 and 15 grades if needed (step 26).

[0026] (5) The maintenance service site 16 which received fault data does the analysis of fault data, and the specific activity of a failure part and a cause, and transmits the contents and the procedure of an activity required for a failure part, a cause, and restoration to the car place 13. In addition, the maintenance service site 16 can also require data required for a cause-of-fault elucidation of a train if needed for the specification of the analysis of fault data, and a failure part and a cause (steps 27 and 28).

[0027] (6) In the car place 13, based on the activity information acquired from the maintenance service site 16, prepare a rehabilitation work and begin a rehabilitation work with arrival of a car (step 29 - 2B).

[0028] In addition, although not shown in drawing 2, a substitute part is arranged through a network 18 to the manufacturers 14 and 15 whom the maintenance service site 16 supplied the equipment which broke down if needed, and a manufacturer can send information required for repair and exchange, a staff, and a substitute part into a car place if needed.

[0029] Since according to the operation gestalt of this invention mentioned above the analysis of fault data and the specific activity of a failure part and a cause can be started from immediately after failure generating of a car and a substitute part etc. can be arranged to a manufacturer with a procedure which was mentioned above, compaction of the release time of a car can be aimed at.

[0030] Moreover, according to the operation gestalt of this invention mentioned above, before initiation of the rehabilitation work of a car, since a rough restoration schedule can be clarified, the time amount whose operation is attained again can be predicted and the schedule of diamond restoration can be formed.

[0031] Although the operation gestalt of this invention mentioned above explained this invention as what was applied for the car maintenance exchange at the time of failure of a rail car, this invention is also applicable to operating automobiles, such as a bus and a freight car, etc.

[0032] Moreover, the operation gestalt of this invention mentioned above was connected noting that it offered exchange for faults, such as failure of the car under operation, but this invention is applicable so that maintenance exchange which used the maintenance service site also at the time of the usual routine inspection may be offered.

[0033]

[Effect of the Invention] As explained above, according to this invention, repair of a failure part and exchange can be carried out promptly, the time amount which car restoration takes can be shortened sharply, and a breakdown can minimize the effect which it has on operation of a car.

[Translation done.]

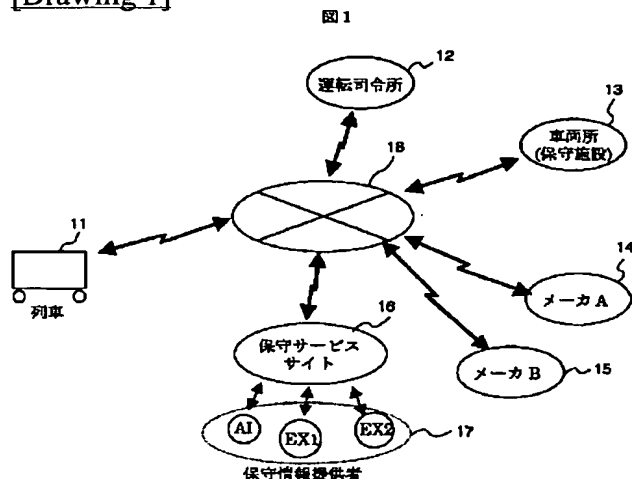
* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

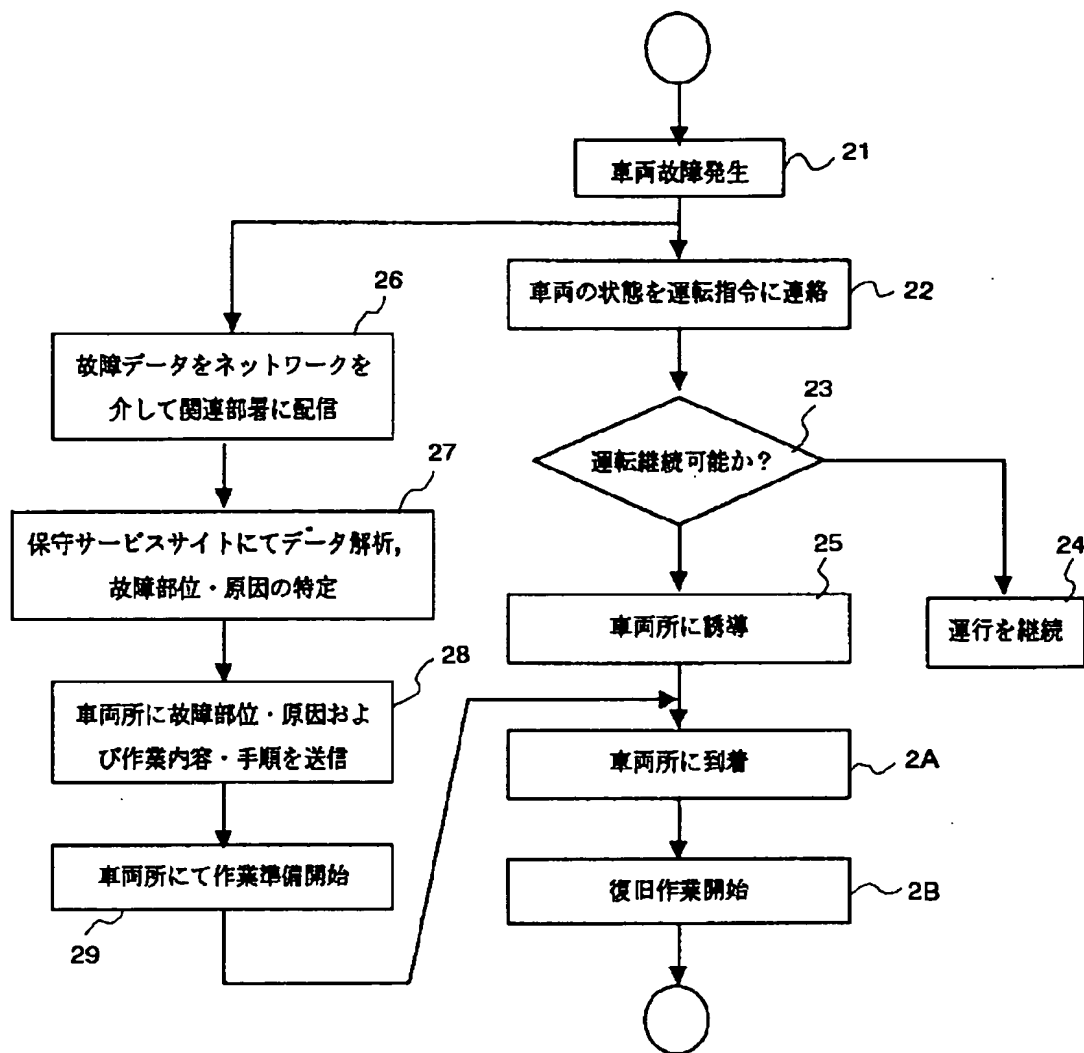
DRAWINGS

[Drawing 1]

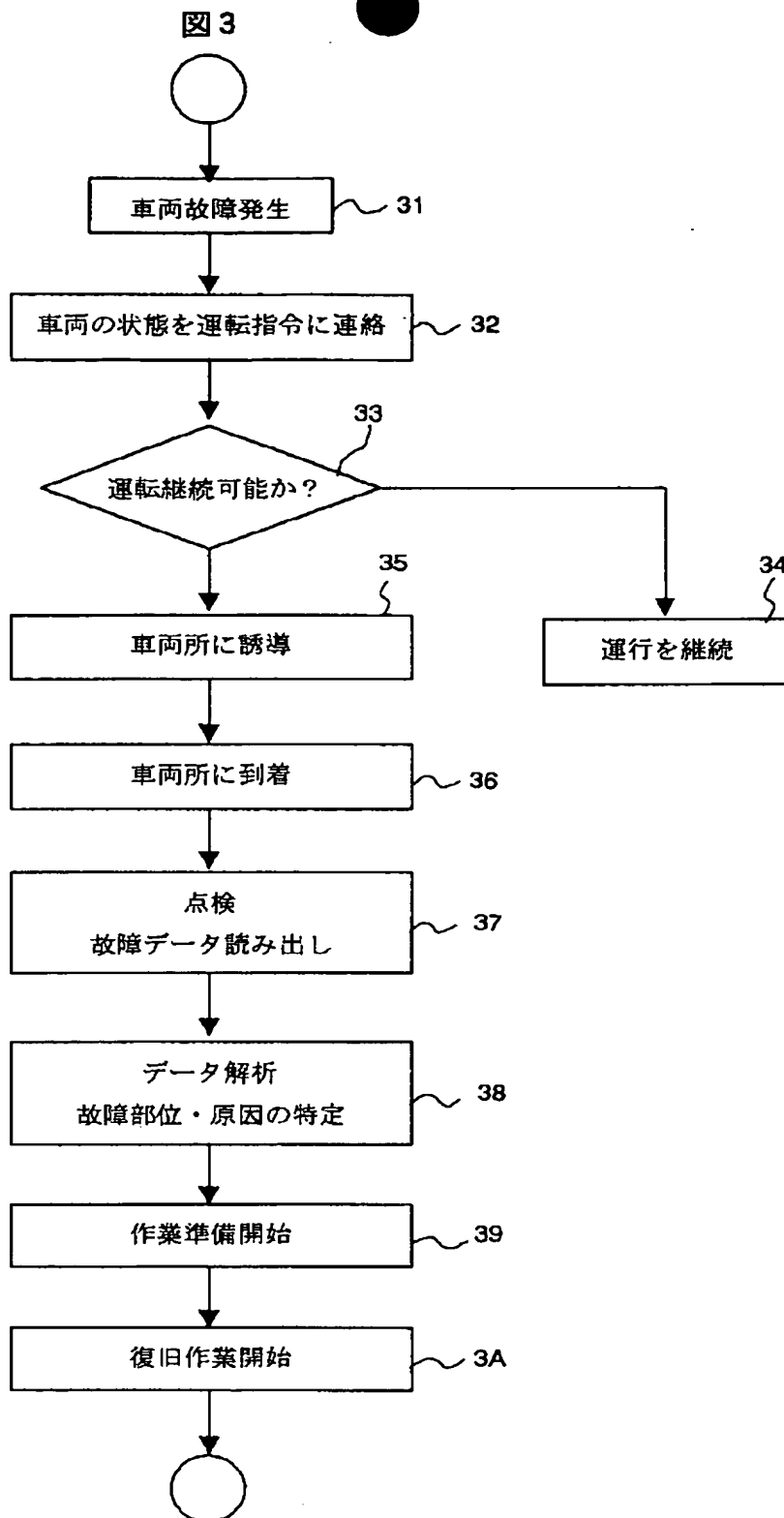


[Drawing 2]

図 2



[Drawing 3]



[Translation done.]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-059834

(43)Date of publication of application : 26.02.2002

(51)Int.Cl.

B61L 27/00

B60S 5/00

(21)Application number : 2000-252536

(71)Applicant : HITACHI LTD

(22)Date of filing : 23.08.2000

(72)Inventor : INARIDA SATOSHI
OZAWA HIROYUKI

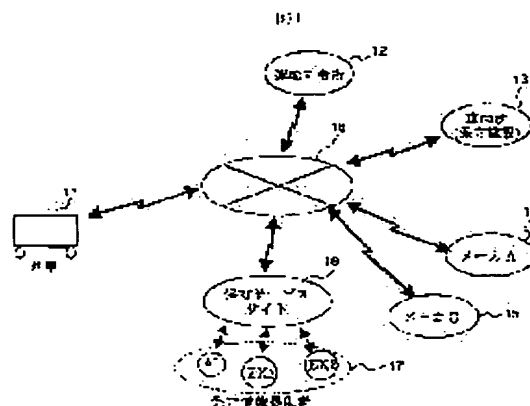
(54) SUPPORTING METHOD AND SUPPORTING SYSTEM FOR VEHICLE MAINTENANCE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a vehicle maintenance supporting system capable of shortening the time required for a recovery, when something gets wrong with a vehicle in operation.

SOLUTION: If something gets wrong with a vehicle, its operator reports the condition of the vehicle to an operation directing center. The operation directing center discriminates whether the defective vehicle can continue operating or not, and if the train can not be operated, the operation of the vehicle is stopped and is led to a vehicle site. On the other hand, data for the defective vehicle are transmitted to related departments through an information transmitting means and a network which are not shown in the figure. A

maintenance service site analyzes the data for the defective vehicle, identifies a defective place and a cause, and transmits the defective place and the cause and the contents and procedures required for a recovery work to the vehicle site. The vehicle site makes preparation for the recovery work based on work information obtained from the maintenance service site, and starts the recovery work as soon as the vehicle arrives. The maintenance service site orders replacement parts from a manufacture who has supplied the defective device at need, and the manufacturer can bring information required for repair, manpower and the replacement parts to the vehicle site whenever at need.



LEGAL STATUS

[Date of request for examination]

07.04.2003

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

(19)日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11)特許出願公開番号
特開2002-59834
(P2002-59834A)

(43)公開日 平成14年2月26日(2002.2.26)

(51)Int.Cl. ⁷	識別記号	F I	テマコード [*] (参考)
B 6 1 L 27/00		B 6 1 L 27/00	A 3 D 0 2 6
B 6 0 S 5/00		B 6 0 S 5/00	5 H 1 6 1

審査請求 未請求 請求項の数4 O L (全 7 頁)

(21)出願番号 特願2000-252536(P2000-252536)

(22)出願日 平成12年8月23日(2000.8.23)

(71)出願人 000005108

株式会社日立製作所

東京都千代田区神田駿河台四丁目6番地

(72)発明者 稲荷田 聡

茨城県ひたちなか市市毛1070番地 株式会
社日立製作所交通システム事業部水戸交通
システム本部内

(72)発明者 小澤 寛之

茨城県ひたちなか市市毛1070番地 株式会
社日立製作所交通システム事業部水戸交通
システム本部内

(74)代理人 100078134

弁理士 武 顕次郎

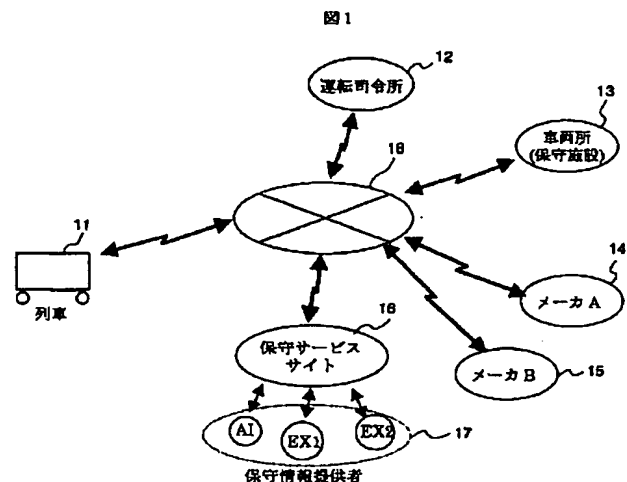
最終頁に続く

(54)【発明の名称】 車両保守支援方法及び支援システム

(57)【要約】

【課題】 運行中の車両等の故障時に、その復旧に要する時間を短縮することを可能とした車両保守支援システムを得る。

【解決手段】 車両に故障が発生すると、その運転手は、車両の状態を運転指令所に連絡し、運転指令所は、その故障車両が運転継続可能か否かを判断し、列車の運行ができない場合、その車両の運転を中止させ、車両を車両所に誘導する。一方、車両の故障データは、無線等の図示しない情報伝達手段及びネットワークを介して関連部署に配信される。故障データを受け取った保守サービスサイトは、故障データの解析、故障部位・原因の特定作業を行い、故障部位・原因及び復旧に必要な作業の内容・手順を車両所に送信し、車両所では、保守サービスサイトから得た作業情報に基づいて、復旧作業の準備を行い、車両の到着とともに復旧作業に取りかかる。保守サービスサイトが、必要に応じて故障した装置を納入したメーカーに交換部品を手配し、メーカーが必要に応じて修理、交換に必要な情報、人員及び交換部品を車両所に送り込むようにすることができる。



【特許請求の範囲】

【請求項 1】 車両保守支援方法において、運行中の車両に故障が発生時、車両の状態を運転指令所に連絡し、列車の運行ができない場合、その車両の運転を中止して車両を車両所に誘導すると共に、車両の故障データを、無線等の情報伝達手段及びネットワークを介して保守サービスサイトに配信し、故障データを受け取った保守サービスサイトは、故障データの解析、故障部位・原因の特定作業を行い、故障部位・原因及び復旧に必要な作業の内容・手順を車両の保守施設である車両所に送信し、車両所は、保守サービスサイトから得た作業情報に基づいて復旧作業の準備を行い、車両の到着と共に復旧作業を開始することを特徴とする車両保守支援方法。

【請求項 2】 前記保守サービスサイトは、故障した装置を納入したメーカーに交換部品を手配し、メーカーは、必要に応じて修理、交換に必要な情報、人員及び交換部品を前記車両所に送り込むことを特徴とする請求項 1 記載の車両保守支援方法。

【請求項 3】 車両保守支援システムにおいて、運行中の車両と、車両の運転を管理している運転指令所と、車両の保守施設である車両所と、保守サービスサイトとがネットワークを介して接続されて構成され、前記運行中の車両は、故障の発生時、車両の故障データを、無線等の情報伝達手段及びネットワークを介して保守サービスサイトに配信し、故障データを受け取った保守サービスサイトは、故障データの解析、故障部位・原因の特定作業を行い、故障部位・原因及び復旧に必要な作業の内容・手順を車両の保守施設である車両所に送信し、車両所は、保守サービスサイトから得た作業情報に基づいて復旧作業の準備を行い、車両の到着と共に復旧作業を行うことを特徴とする車両保守支援システム。

【請求項 4】 前記ネットワークに車両機器メーカーが接続され、前記保守サービスサイトは、故障した装置を納入したメーカーに交換部品を手配し、メーカーは、必要に応じて修理、交換に必要な情報、人員及び交換部品を前記車両所に送り込むことを特徴とする請求項 3 記載の車両保守支援システム。

【発明の詳細な説明】**【0001】**

【発明の属する技術分野】 本発明は、車両保守支援方法及び支援システムに係り、特に、運行中の鉄道車両等の故障時に、その復旧に要する時間を短縮することを可能とした車両保守支援方法及び支援システムに関する。

【0002】

【従来技術】 一般に、運行中の鉄道車両に故障が発生した場合、その故障情報が運転手から運転指令に伝達される。その後、運転指令の判断により、車両は、車両の保守を行う車両所に回送され故障箇所の修理が行われる。このとき、故障の状況から故障の部位や原因を明らかにできる場合、車両所では、故障車両の到着以前に修理ま

たは故障部位の交換の準備を行い、故障が発生した車両の到着と同時に作業を開始する。

【0003】 前述した従来技術による車両保守支援の方法は、前述により、車両故障発生から復旧までの時間を極力短くし、列車の運行への影響を最小限にしている。

【0004】 一方、前述した従来技術は、故障の発生状況や運転手及び運転指令が得られた情報によっては、故障の部位や原因が明らかにできない場合がある。

【0005】 図 3 は従来技術による車両保守支援における復旧手順を説明するフローチャートであり、以下、これについて説明する。

【0006】 (1) 運行中の車両に故障が発生すると、その運転手は、車両の状態を運転指令に連絡する（ステップ 31、32）。

【0007】 (2) 運転指令は、その故障車両が運転継続可能か否かを受け取った車両の状態から判断し、運転可能であった場合、そのまま運転を継続させる（ステップ 33、34）。

【0008】 (3) ステップ 33 で、運転指令が運転継続不可能と判断した場合、その車両による通常の営業運転等の車両の運転を中止する。そして、その故障した車両は、運転指令の指示により車両所に誘導される（ステップ 35）。

【0009】 (4) 車両が車両所に到着した後、車両所において、故障が疑われる部位の点検や車載されている故障データ蓄積装置からのデータ読み出しを行い、故障データの解析及び故障部位・原因の特定を行うと共に対応策の検討を行う（ステップ 36～38）。

【0010】 (5) ステップ 38 での検討結果に基づいて、作業の準備を開始し、故障部位の修理を開始する。故障部位の修理が困難な場合や交換した方が早く復旧する場合、故障部位の交換を行う。その際、修理が困難でかつ交換部品がない場合等には、メーカーに連絡して交換部品を取り寄せ交換部品到着後交換作業を行って、車両の復旧を行う（ステップ 39、3A）。

【0011】 前述したように、従来技術は、故障の発生状況や運転手及び運転指令が得られた情報によっては、故障の部位や原因が明らかにできない場合、故障車両が車両所に到着してからでないと、故障データの読み出し、データ解析を行うことができないものであった。

【0012】

【発明が解決しようとする課題】 前述のように、従来技術による車両保守支援は、故障した車両が車両所に到着してから故障が疑われる部位の点検や車載されている故障データ蓄積装置からのデータ読み出しを行い、故障データの解析及び故障部位・原因の特定を行うと共に対応策の検討を行っていたので、車両故障の発生から復旧までに多くの時間を要し、列車の運行に支障をきたす懸念があるという問題点を有している。

【0013】 本発明の目的は、前述した従来技術の問題

点を解決し、運行中の車両等の故障時に、その復旧に要する時間を短縮することを可能とした車両保守支援方法及び支援システムを提供することにある。

【0014】

【課題を解決するための手段】本発明によれば前記目的は、車両保守支援方法において、運行中の車両に故障が発生時、車両の状態を運転指令所に連絡し、列車運行ができない場合、その車両の運転を中止して車両を車両所に誘導すると共に、車両の故障データを、無線等の情報伝達手段及びネットワークを介して保守サービスサイトに配信し、故障データを受け取った保守サービスサイトは、故障データの解析、故障部位・原因の特定作業を行い、故障部位・原因及び復旧に必要な作業の内容・手順を車両の保守施設である車両所に送信し、車両所は、保守サービスサイトから得た作業情報に基づいて復旧作業の準備を行い、車両の到着と共に復旧作業を開始することにより達成される。

【0015】また、前記目的は、車両保守支援システムにおいて、運行中の車両と、車両の運転を管理している運転指令所と、車両の保守施設である車両所と、保守サービスサイトとがネットワークを介して接続されて構成され、前記運行中の車両が、故障の発生時、車両の故障データを、無線等の情報伝達手段及びネットワークを介して保守サービスサイトに配信し、故障データを受け取った保守サービスサイトが、故障データの解析、故障部位・原因の特定作業を行い、故障部位・原因及び復旧に必要な作業の内容・手順を車両の保守施設である車両所に送信し、車両所が、保守サービスサイトから得た作業情報に基づいて復旧作業の準備を行い、車両の到着と共に復旧作業を行うことにより達成される。

【0016】本発明は、前述した手段を備えることにより、車両所において、車両の到着を待つことなく故障部位の特定、修理の準備、交換部品の手配が可能となり、故障車両が車両所に到着すると即座に復旧作業を開始することができ、車両復旧に要する時間を大幅に短縮することができる。

【0017】

【発明の実施形態】以下、本発明による車両保守支援システムの一実施形態を図面により詳細に説明する。

【0018】図1は本発明の一実施形態による車両保守支援システムの構成を示すブロック図、図2は車両故障発生時の対応手順を説明するフローチャートである。図1において、11は列車、12は運転指令所、13は車両所、14、15はメーカA、B、16は保守サービスサイト、17は保守情報提供者、18はネットワークである。

【0019】本発明の一実施形態による車両保守支援システムは、図1に示すように、列車11、列車の運行を管理する運転指令所12、保守・修理等を行う車両所13、車両機器のメーカ14、15、及び、保守情報提供

者17を有する保守サービスサイト16が、それぞれが持つ通信装置を介してネットワーク18に接続され、相互に情報の授受を行うことが可能に構成されている。

【0020】前述において、保守サービスサイト16は、車両故障に関連するデータを、車両故障に関するデータベースとしてして備えると共に、車両保守の情報を有するメーカ等の経験者からの情報を受けることができるように構成されている。これらのデータベース及び経験者である保守情報提供者17は、前記ネットワーク18あるいは第2のネットワークを介して保守サービスサイトに接続されていてよい。データベースは、車両の搭載装置のIDを管理しており、また、製造者、修理履歴、運転履歴等をも管理することができ、故障データの解析に役立てることができる。

【0021】次に、前述したように構成される本発明の実施形態において、運行中の列車に車両故障が発生したときの対応手順を図2に示すフローを参照して説明する。

【0022】(1) 運行中の車両に故障が発生すると、その運転手は、車両の状態を運転指令所に連絡する(ステップ21、22)。

【0023】(2) 運転指令所は、その故障車両が運転継続可能か否かを受け取った車両の状態から判断し、運転手に対して対応手順を指示する。運転手は、運転指令所からの指示にし従った操作を行う。この結果、運転可能であった場合、そのまま運転を継続させる(ステップ23、24)。

【0024】(3) ステップ33で、運転指令所が、列車の運行続行が好ましくないと判断すると、その車両による通常の営業運転等の車両の運転を中止して乗客を降ろす。そして、その故障した車両は、運転指令の指示により車両所に誘導される(ステップ25)。

【0025】(4) 一方、運行中の車両に故障が発生すると、その車両の故障データは、無線等の図示しない情報伝達手段及びネットワーク18を介して運転指令所12、車両所13、保守サービスサイト16に配信され、また、必要に応じて車両機器メーカ14、15等の関連部署に配信される(ステップ26)。

【0026】(5) 故障データを受け取った保守サービスサイト16は、故障データの解析、故障部位・原因の特定作業を行い、故障部位・原因及び復旧に必要な作業の内容・手順を車両所13に送信する。なお、保守サービスサイト16は、故障データの解析、故障部位・原因の特定のために、必要に応じて、故障原因解明に必要なデータを列車に要求することもできる(ステップ27、28)。

【0027】(6) 車両所13では、保守サービスサイト16から得た作業情報に基づいて、復旧作業の準備を行い、車両の到着とともに復旧作業に取りかかる(ステップ29～2B)。

【0028】なお、図2には示していないが、保守サービスサイト16が、必要に応じて故障した装置を納入したメーカ14、15にネットワーク18を介して交換部品を手配し、メーカが必要に応じて修理、交換に必要な情報、人員及び交換部品を車両所に送り込むようにすることができる。

【0029】前述した本発明の実施形態によれば、前述したような手順により、車両の故障発生の後から故障データの解析、故障部位・原因の特定作業を開始することができ、また、メーカに交換部品等を手配することができるので、車両の復旧時間の短縮を図ることができる。

【0030】また、前述した本発明の実施形態によれば、車両の復旧作業の開始前に、大まかな復旧スケジュールを明らかにすることができるため、再び運転可能となる時間を予測することができ、ダイヤ復旧の予定を立てることができる。

【0031】前述した本発明の実施形態は、本発明を鉄道車両の故障時の車両保守支援のために適用したものとして説明したが、本発明は、バス、貨物車等の営業自動車等に適用することもできる。

【0032】また、前述した本発明の実施形態は、運行中の車両の故障等の不具合に対する支援を行うとして接続したが、本発明は、通常の定期点検時にも保守サービ

スサイトを使用した保守支援を行うように適用することができる。

【0033】

【発明の効果】以上説明したように本発明によれば、故障部位の修繕、交換を速やかに実施することができ、車両復旧に要する時間を大幅に短縮することができ、車両故障が車両の運行に与える影響を最小限にとどめることができる。

【図面の簡単な説明】

【図1】本発明の一実施形態による車両保守支援システムの構成を示すブロック図である。

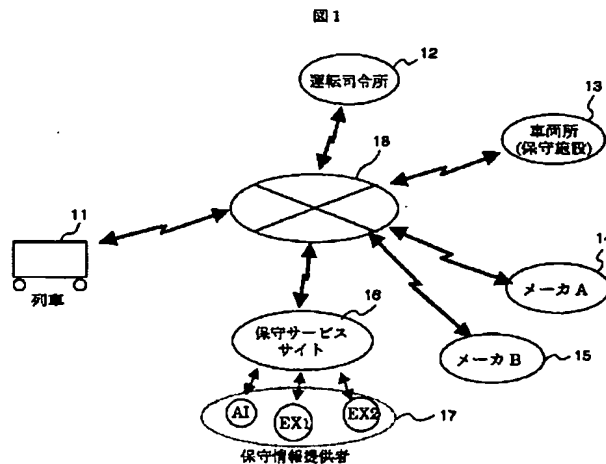
【図2】車両故障発生時の対応手順を説明するフローチャートである。

【図3】従来技術による車両保守支援における復旧手順を説明するフローチャートである。

【符号の説明】

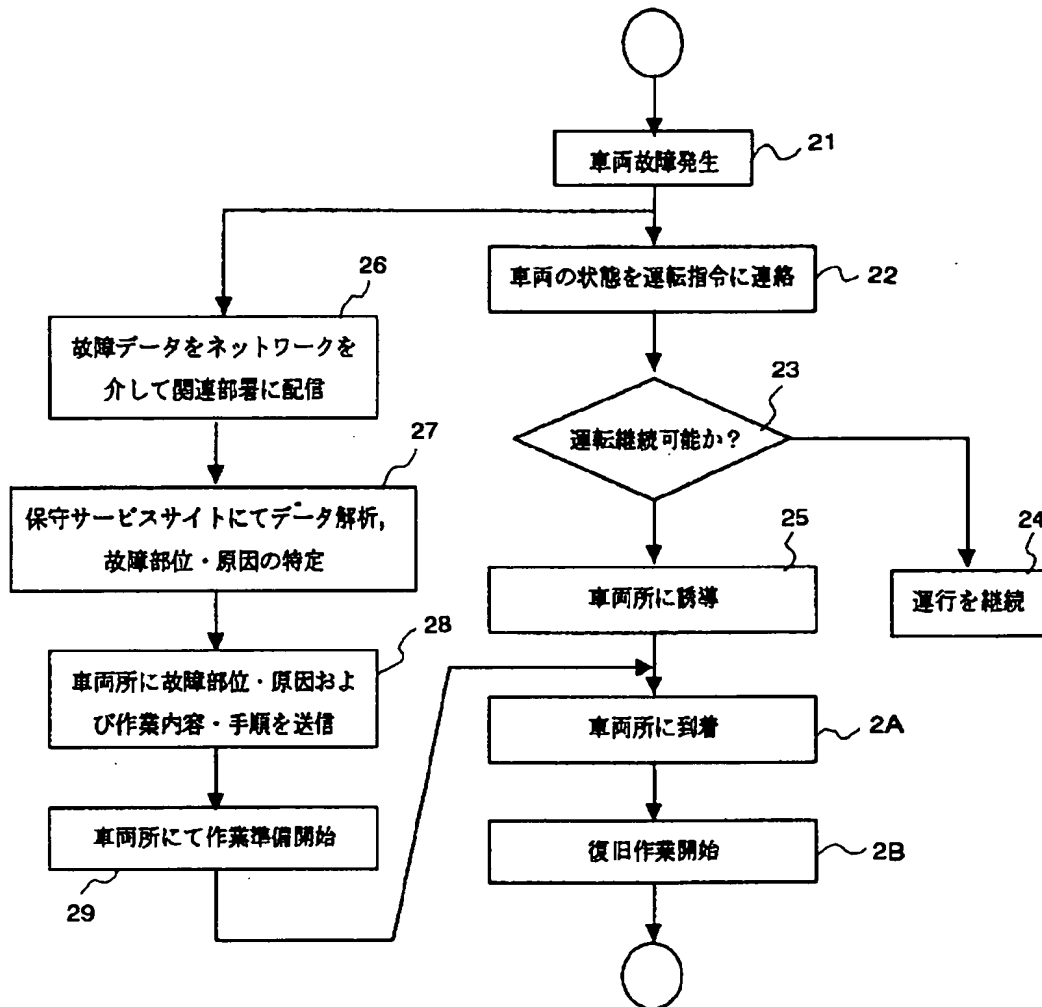
- 11 列車
- 12 運転指令所
- 13 車両所
- 14、15 メーカA、B
- 16 保守サービスサイト
- 17 保守情報提供者
- 18 ネットワーク

【図1】

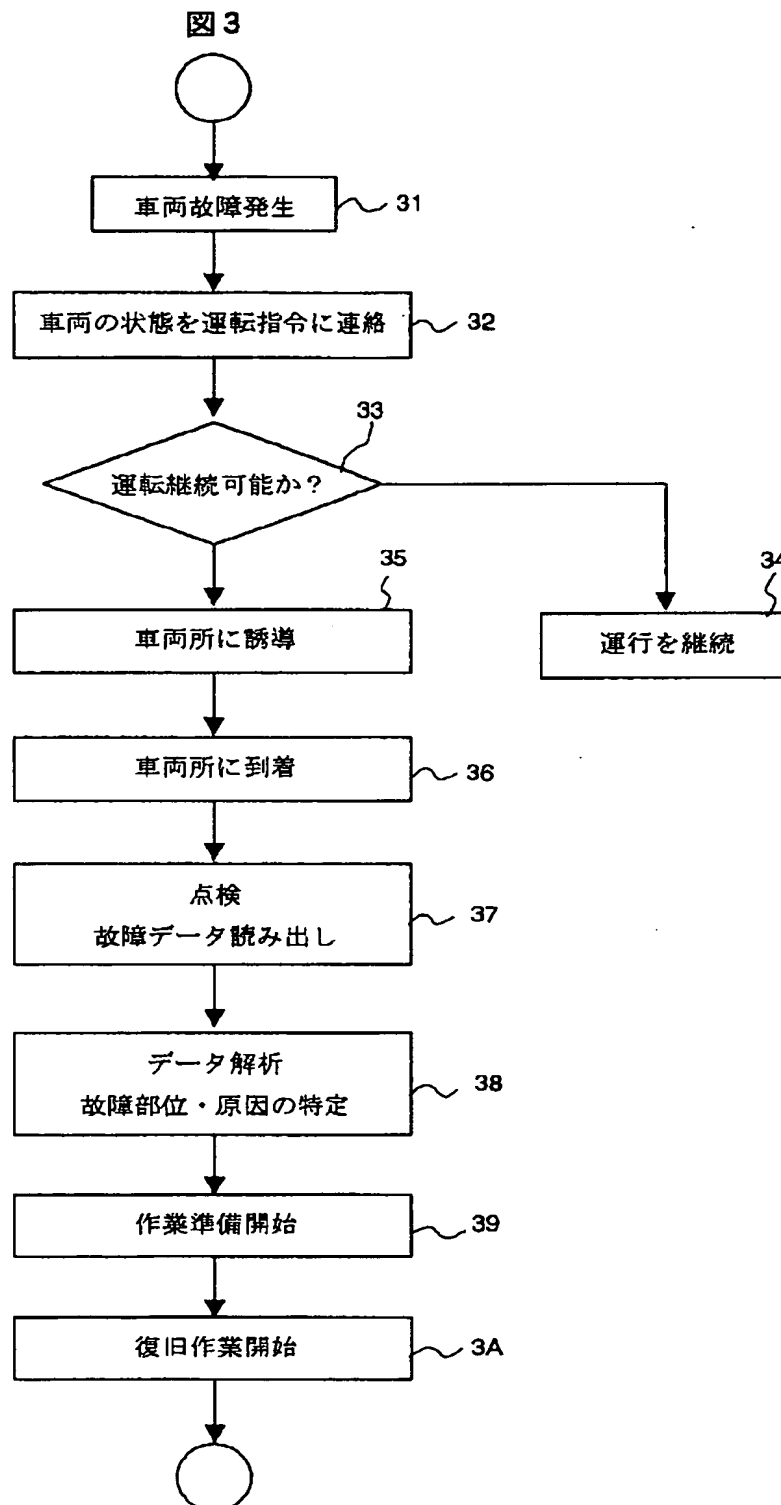


【図2】

図2



【図3】



フロントページの続き

Fターム(参考) 3D026 BA01 BA21 BA27
5H161 AA01 JJ01 JJ29 JJ40

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.